



Learning Automation Update

September 18, 2013

Avijit Mukherjee
Banavar Sridhar
Deepak Kulkarni
Heather Arneson
Shon Grabbe

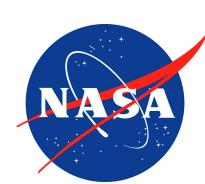


Research Objective

Given relevant NAS status, weather and traffic information determine the “best” collection of Traffic Management Initiatives to implement for day-of-operation planning purposes.

Assumption:

- 2013 work focused exclusively on using weather observations
- Future work will consider weather forecasts



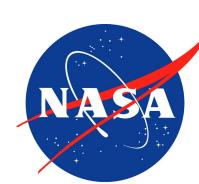
2013 Accomplishments

Learning Automation Related

- Developed initial approaches for clustering days based on en route convective impacts and the location and cause of Ground Delay Programs
- Analyzed and ranked historical routing options used in conjunction with the en route clusters
- Exploring refined reroute clustering approaches to help define the “national plan”
- Prototype system developed for visualizing clustering and Digital TMI results

Related Data Mining Work

Developed models for predicting if Ground Delay Program and Miles-in-Trail restrictions are required given weather and traffic observations

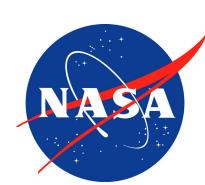


Evaluator Concept Connection

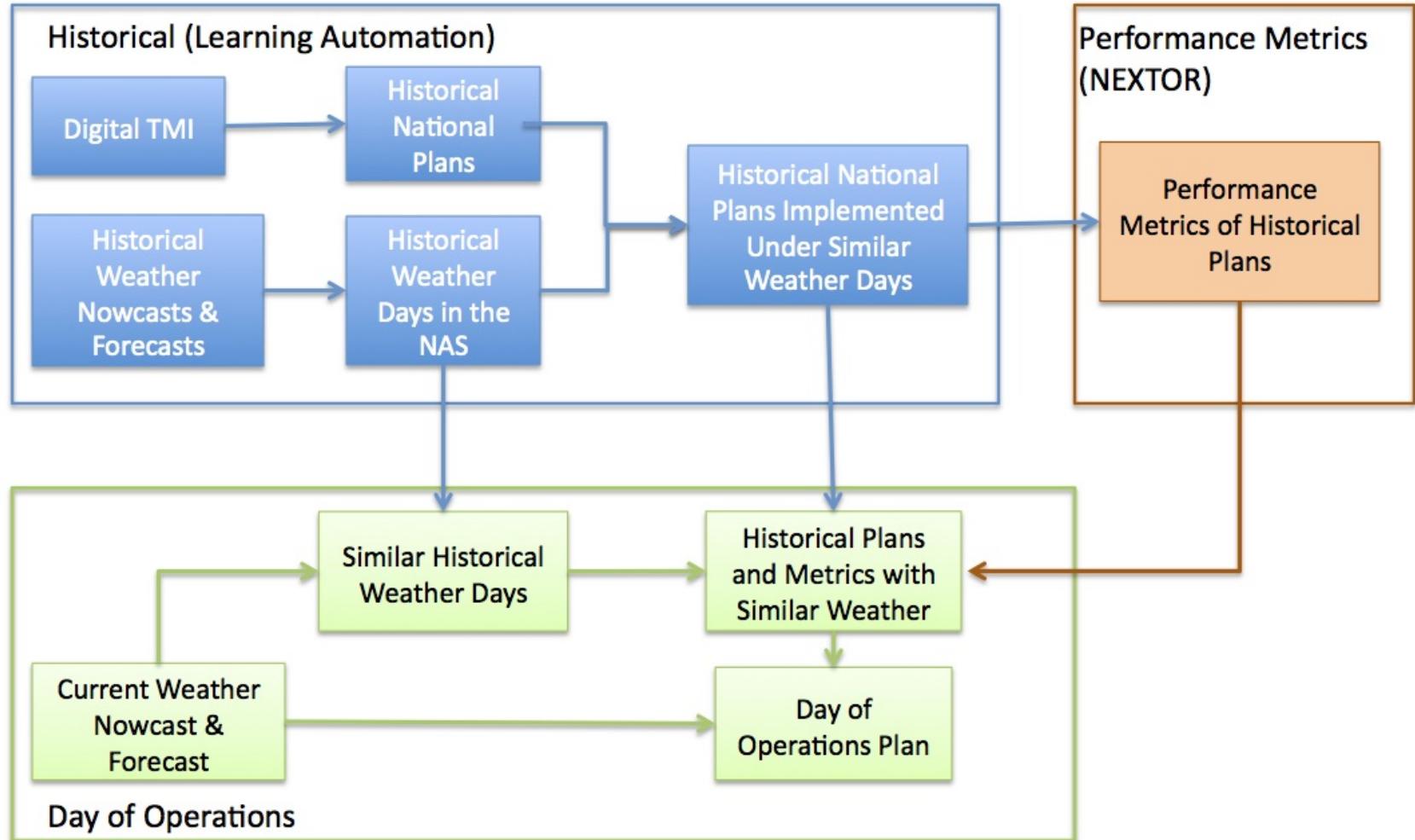
Clustering days based on historical convective weather and the location and cause of Ground Delay Programs

“... the Evaluator makes use of its learning automation capabilities to incorporate lessons learned from earlier interventions, their project impact and the actual results experienced. The experiences used to automatically inform future response strategies – or the prioritization of the options against one another on the list of candidate responses.”

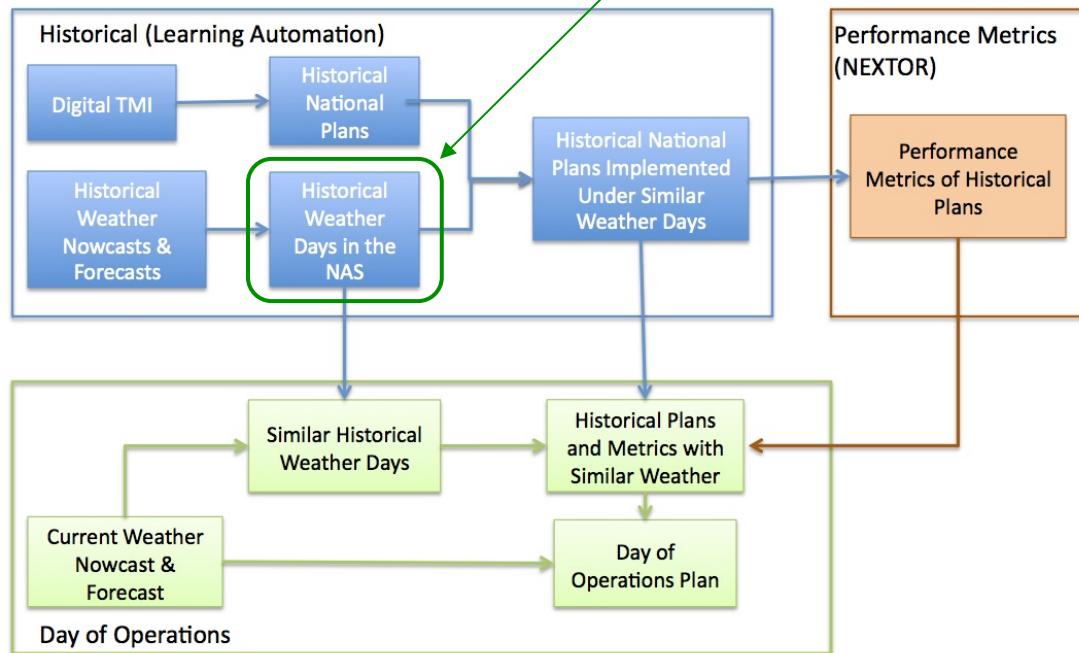
- Analysis of reroutes used in conjunction with similar convective weather constraints
- Route clustering work (simplifies the list of candidate responses)



Approach

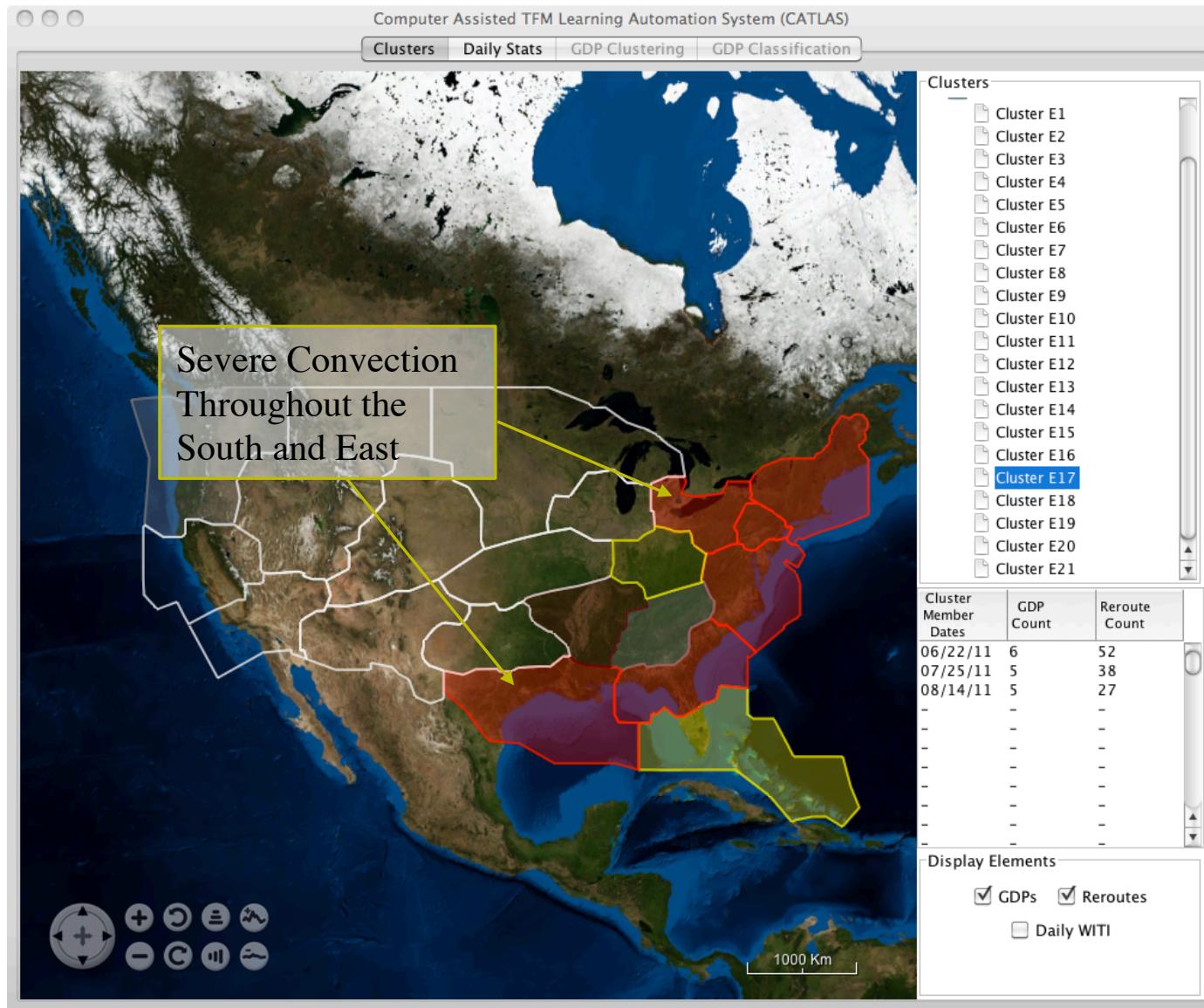


Historical Days in the NAS: an Airspace Perspective



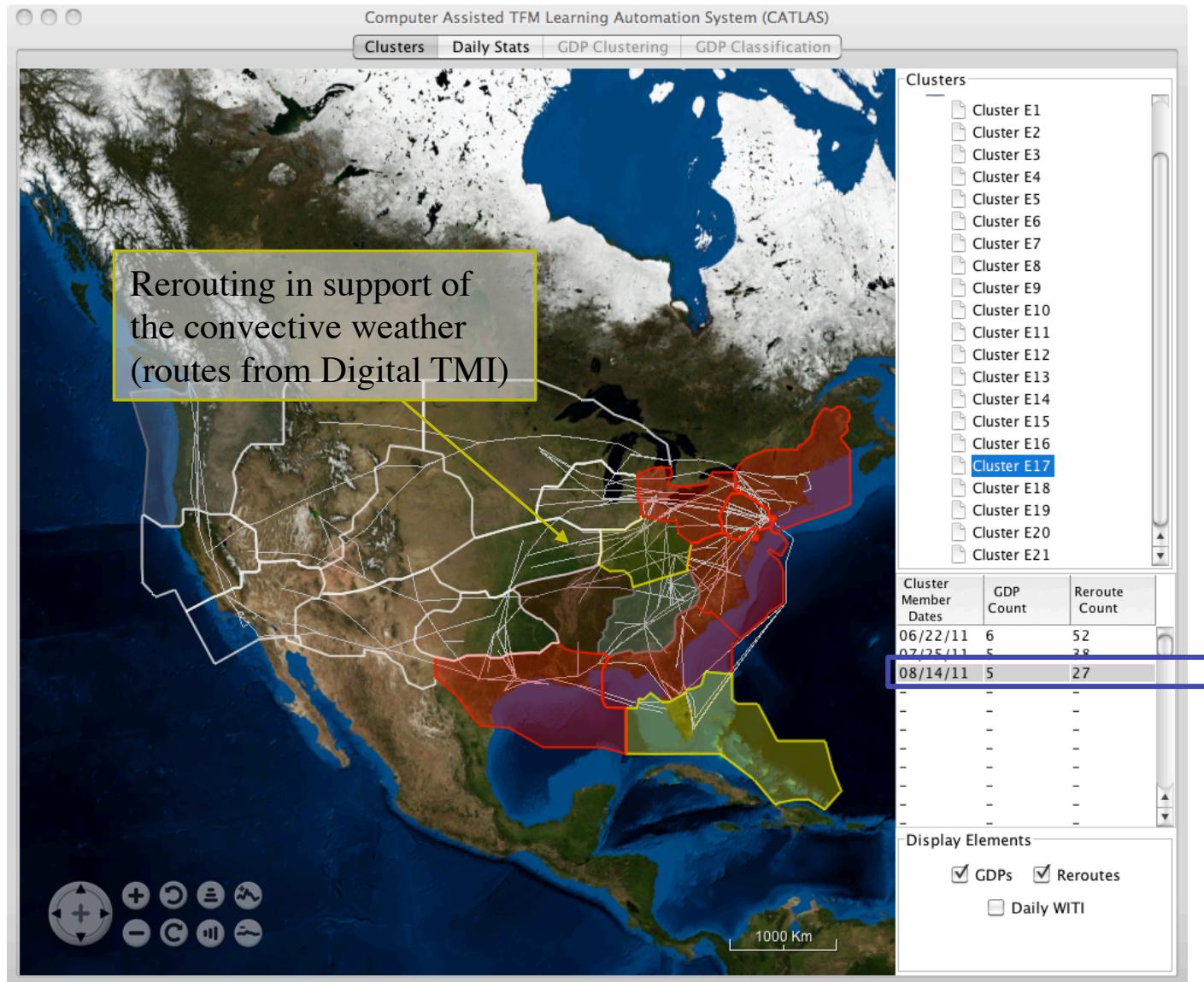


National-level En route Clustering: Cluster 17, 3 days



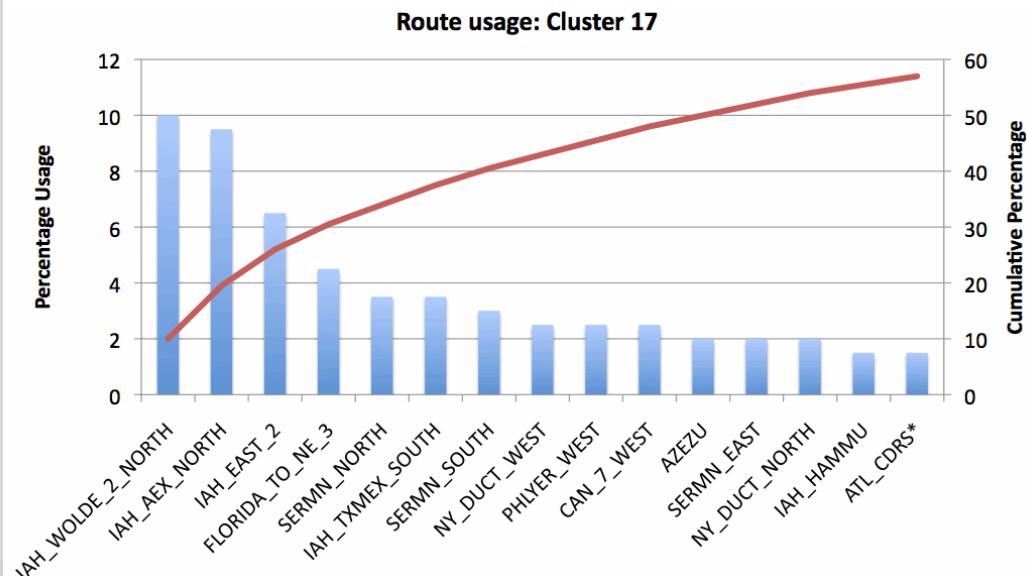
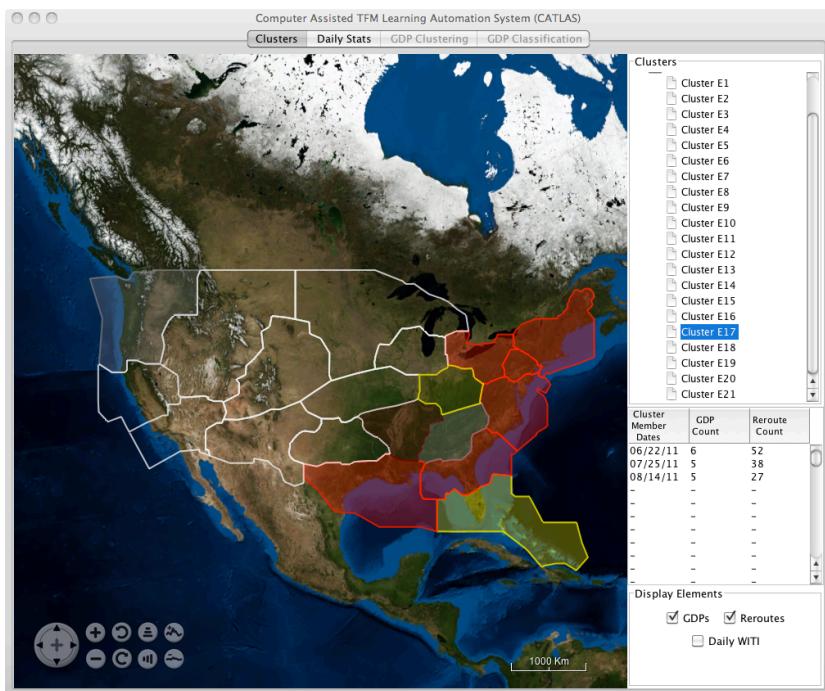


National-level En route Clustering: Cluster 17, 3 days

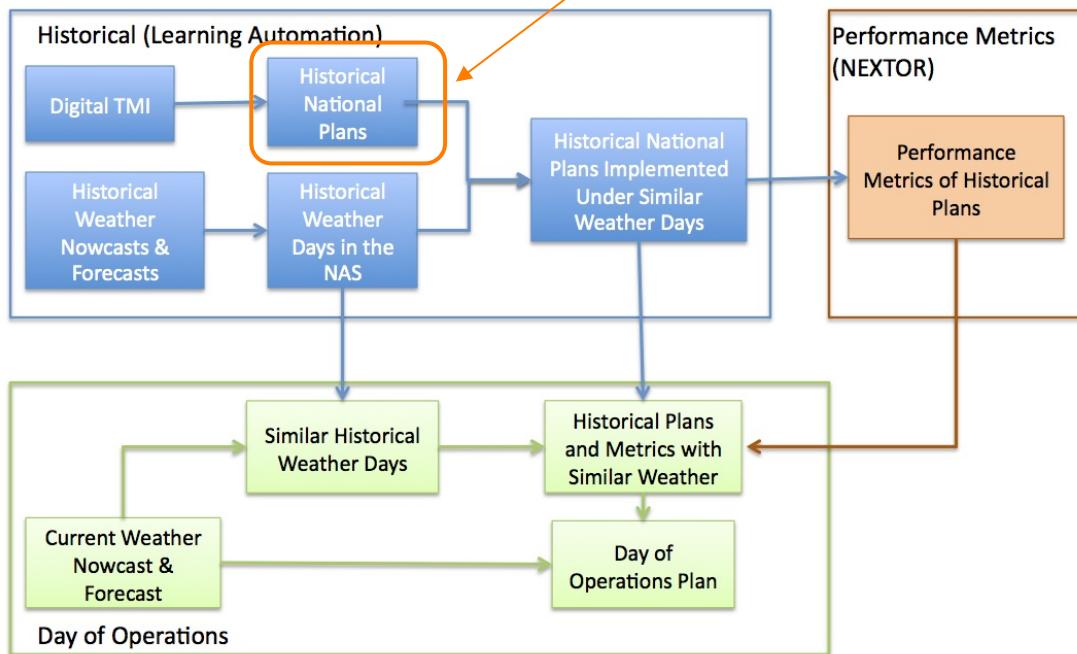




National-level En route Clustering: Cluster 17, 3 days

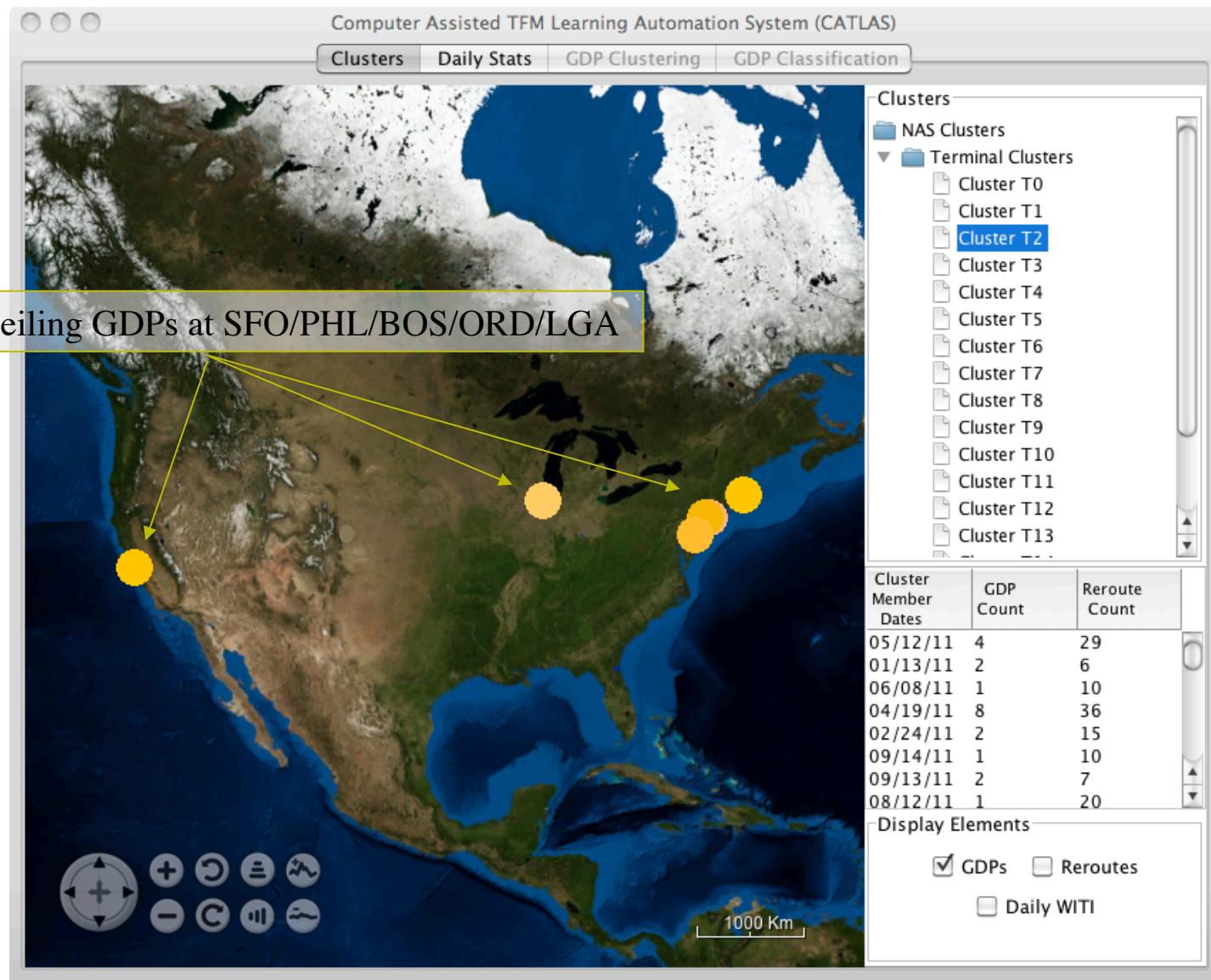


Historical Days in the NAS: an Airport Perspective



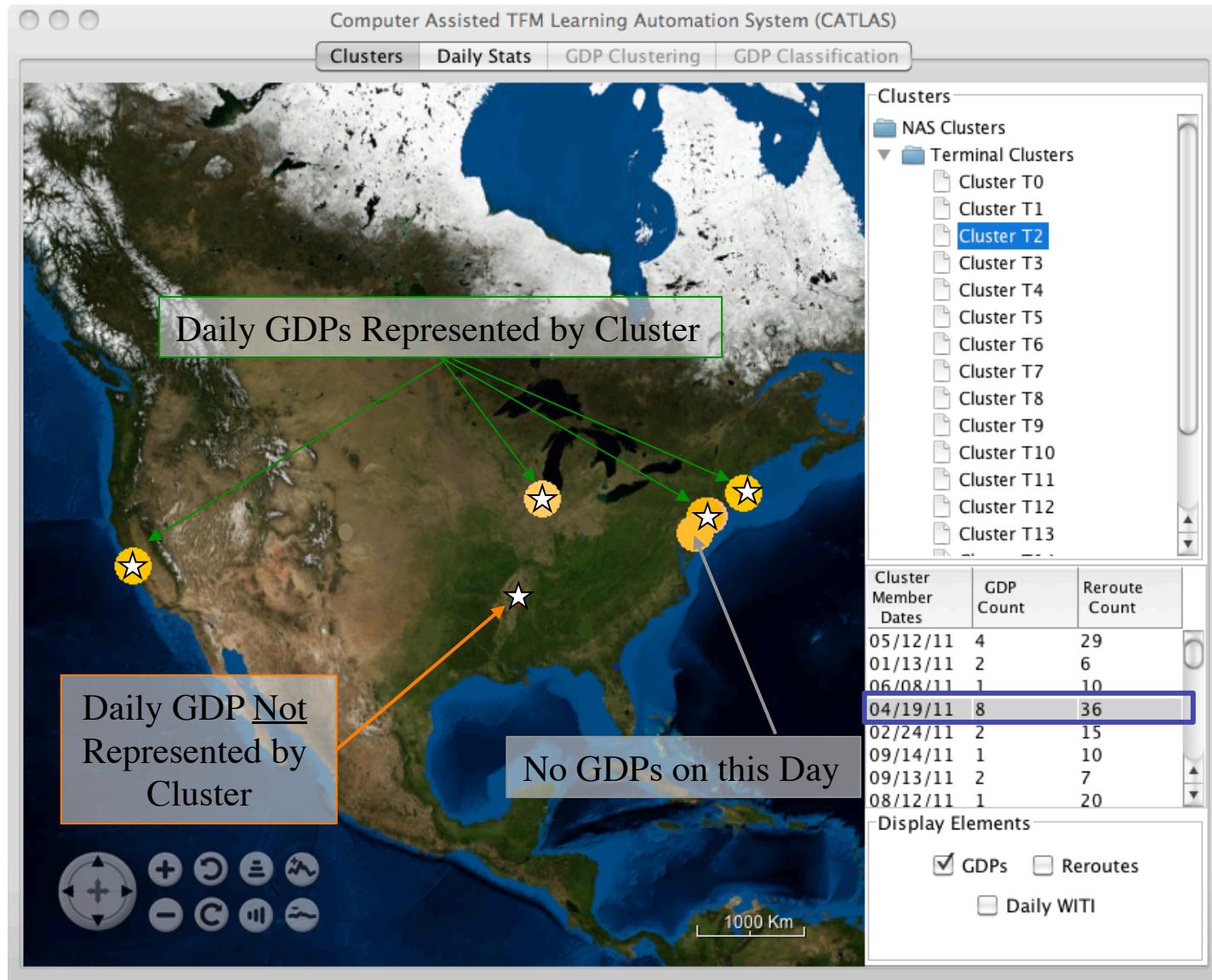


National-level Airport Clustering: Cluster 2, 32 days





National-level Airport Clustering: Cluster 2, 32 days



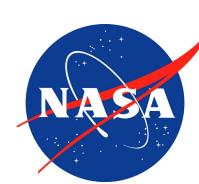


Next Steps

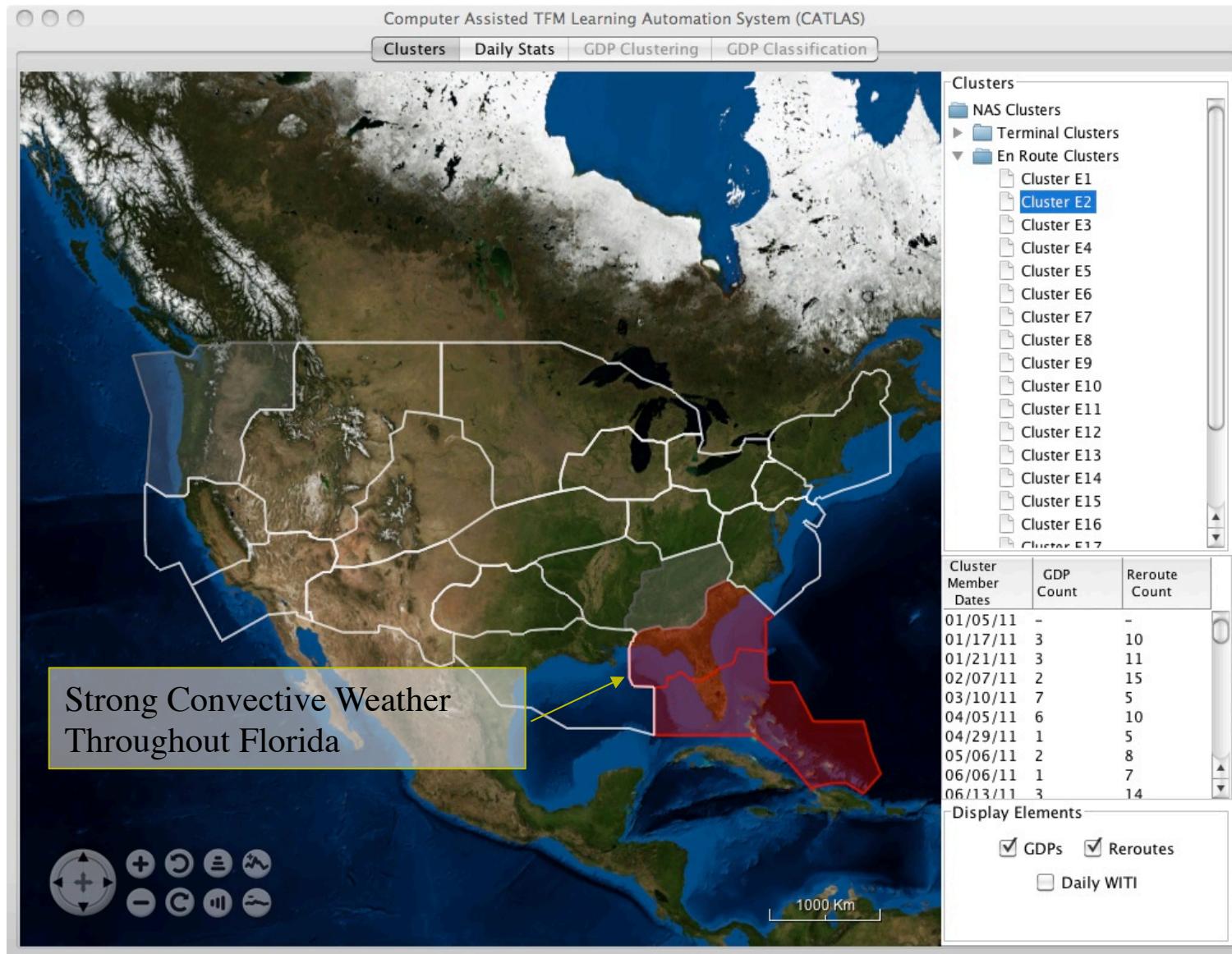
- Develop techniques to identify airport-level days in the NAS using weather observations and forecasts
- Extend airspace-level days in the NAS work to consider weather forecasts
- Explore techniques for describing the “national plans”
- Begin coordination with NEXTOR regarding performance metrics

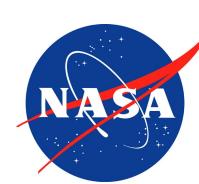


Backup

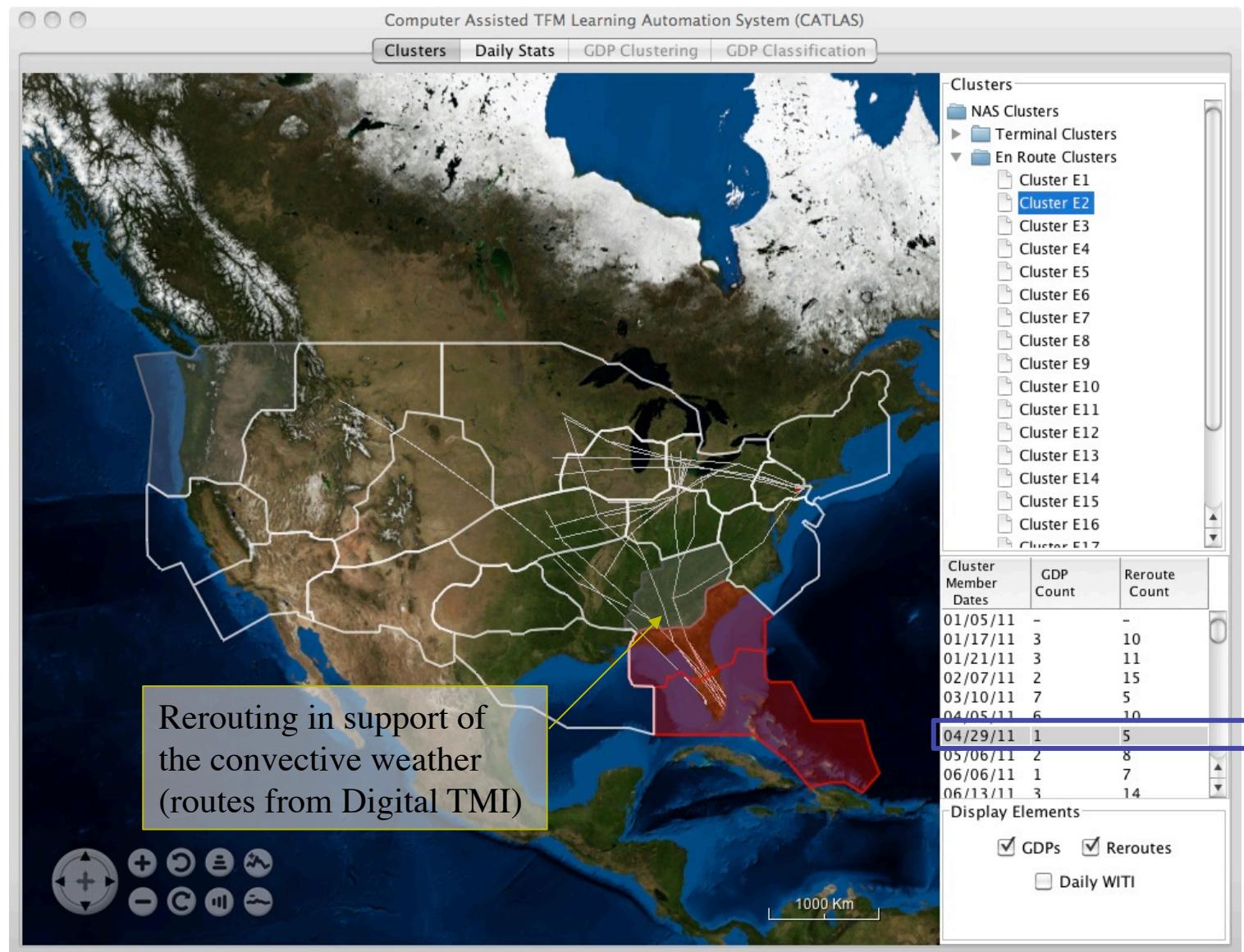


National-level Clustering: Cluster 2, 33 days



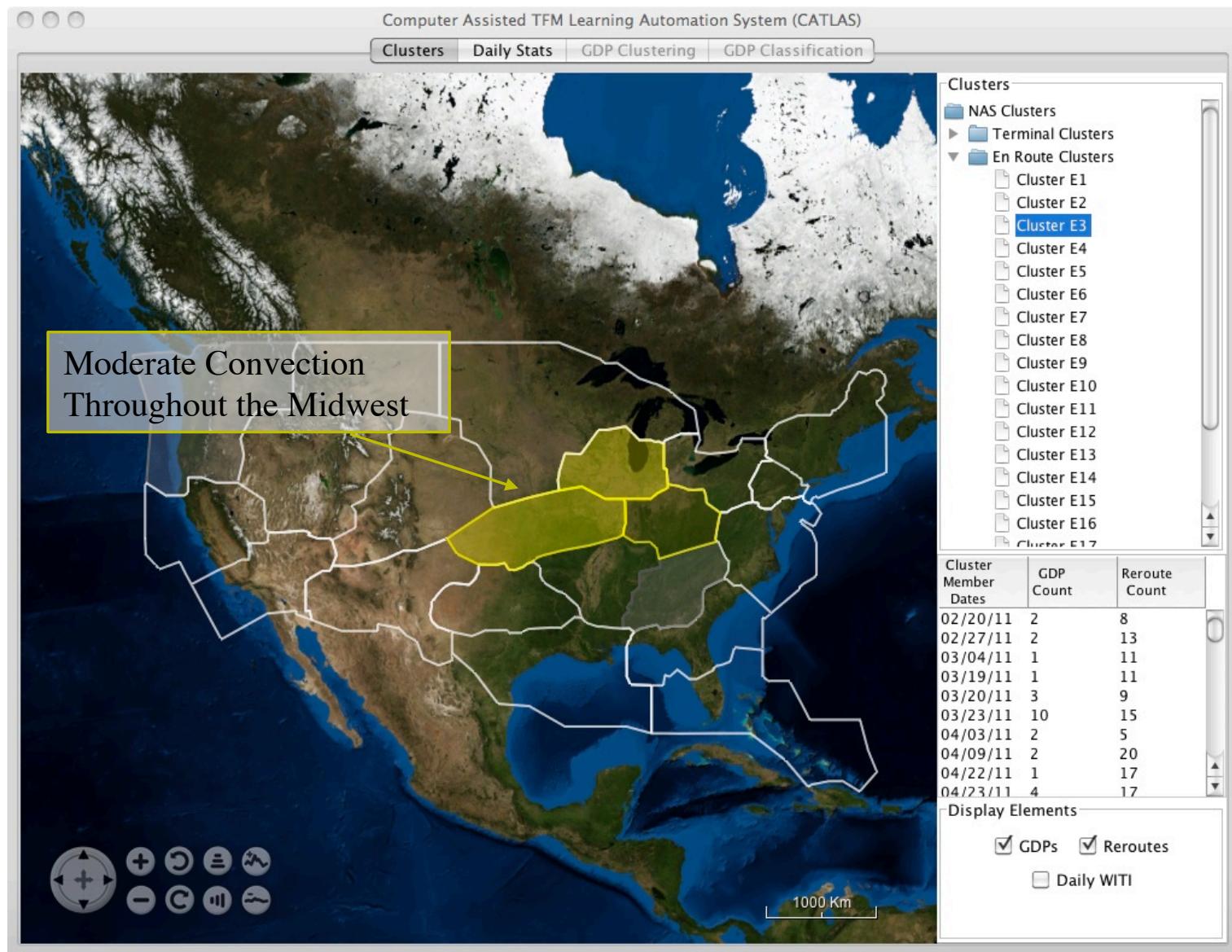


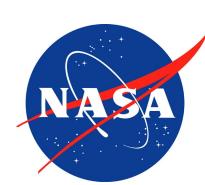
National-level Clustering: Cluster 2, 33 days





National-level Clustering: Cluster 3, 23 days





National-level Clustering: Cluster 3, 23 days

